

Topmouth Culter (*Culter alburnus*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, June 2012
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1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2016):

“Asia: Lake Buir, Onon and Kherlen drainages in Mongolia; Amur to Red River drainages, Taiwan and Hainan.”

Status in the United States

This species has not been reported in the United States.

Means of Introduction into the United States

This species has not been reported in the United States.

Remarks

Froese and Pauly (2016) report the use of the common name of Grass Carp in Russia and the common name of Lookup in Mongolia to refer to *Culter alburnus*.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2016):

“Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Culter* Basilewsky, 1855
Species *Culter alburnus* Basilewsky, 1855”

“Current Standing: valid”

Size, Weight, and Age Range

From Froese and Pauly (2016):

“Maturity: Lm ?, range 20 - ? cm

Max length : 92.8 cm FL male/unsexed; [Wang et al. 2012]; common length : 28.0 cm NG male/unsexed; [Nichols 1943]; max. published weight: 600.00 g [Novikov et al. 2002]”

Environment

From Froese and Pauly (2016):

“Freshwater; benthopelagic.”

Climate/Range

From Froese and Pauly (2016):

“Temperate, preferred ?”

Distribution Outside the United States

Native

From Froese and Pauly (2016):

“Asia: Lake Buir, Onon and Kherlen drainages in Mongolia; Amur to Red River drainages, Taiwan and Hainan.”

Introduced

From Chiu et al. (2012):

“*Culter alburnus* naturally occurs in Sun Moon Lake, central Taiwan, and was frequently introduced into reservoirs, ponds, and streams on the west coast of Taiwan (Chang 2003).”

“*Culter alburnus* [...] was introduced into Feitsui Reservoir and its surrounding streams of northern Taiwan after 2000.”

From Kolpakov et al. (2010):

“This species was recently introduced into the estuary of the Razdol’naya River [Kolpakov and Barabanshchikov, 2008].”

Means of Introduction Outside the United States

From Chiu et al. (2012):

“In Taiwan, introductions of indigenous fish species by anglers are commonly documented (Ma et al. 2006).”

From Kolpakov et al. (2010):

“Nonindigenous species penetrate into the [Razdol’naya] river mainly as a result of aquaculture activity. The main water body donor is Khanka Lake (basin of the Amur River).”

Short Description

From Luo (1994):

“Yih and Chu (1959) redescribed *Culter alburnus* Basilewsky and *Culter erythropterus* Basilewsky. They pointed out that, in *C. alburnus*, the ventral keel was actually [sic] incomplete and the fins were dark grey in colour, while in *C. erythropterus*, the ventral keel was complete and fins were orange in colour.”

From Chiu et al. (2012):

“The mouth opening of *Cul. alburnus* is in a very high frontal position (Chen 2009).”

Biology

From Froese and Pauly (2016):

“Inhabits rivers [Berg 1964; Reshetnikov et al. 1997], floodplain lakes which are overgrown with aquatic macrophytes [Dulmaa 1999].”

From Chiu et al. (2012):

“*Culter alburnus* is a predatory species of the mid- and upper water zones of lentic waters (Chen 2009). The diet of *Cul. alburnus* includes early developmental stages of aquatic invertebrates when it is younger and has a smaller body size, and then it begins to prey mainly on fish after its body length exceeds 150 mm (Liu 2008).”

From Yin et al. (2004):

“The female *Cutter* [sic] *alburnus* matures at 5 years old in Xingkai Lake. It lays floating eggs and the breeding date is about from the last ten-days of June to the middle ten-days of July. Mature adults migrate to spawning field in breeding season and spawn when continual wind and wave appears.”

Human Uses

From Li et al. (2010):

“In China, this species is a very important commercial freshwater fish and widely distributed in the large rivers, reservoirs and lakes. Because of market demand for the fish on the increase, the cultured production of this species has expanded significantly recent year [sic] (Wang et al. 2007).”

From Kolpakov et al. (2010):

“Currently, this species may be an object of sport fishing and may be harvested as an associated species with other commercial fish.”

Diseases

From Luo et al. (2002):

“A pseudophyllidean cestode, which was initially called *Bothriocephalus gowkongensis* Yeh, 1955 (now a synonym of *B. acheilognathi* Yamaguti, 1934), was first found in the 1950s as an important pathogen in grass carp *Ctenopharyngodon idella* (Cuvier & Valenciennes), the major fish species in aquaculture in China (Liao & Shih, 1956). [...] The present study represents the first molecular phylogenetic analysis of *Bothriocephalus acheilognathi* from eleven different species of fish hosts collected mainly in China but also in Australia, the Czech Republic, England and Hawaii. [...] In the present study, three species of fish, i.e. *Culter alburnus*, *Hemiculter bleekeri* and *Coreius guichenoti*, have not previously been reported as hosts.”

Threat to Humans

From Froese and Pauly (2016):

“Harmless.”

3 Impacts of Introductions

From Chiu et al. (2012):

“After its introduction into the Feitsui Reservoir, northern Taiwan, in 2000, the abundance of *Cul. alburnus* in the reservoir increased, and expanded its distribution into surrounding streams after 2002 (Chang 2003). By 2007, *Cul. alburnus* had become the 2nd most abundant fish species in the Feitsui Reservoir (Wang 2007).”

“Based on the diet analysis, larger *Cul. alburnus* fed primarily on *Can. barbata*. The significantly lower abundances of *Can. barbata* below the dam during the sampling period can at least partially be attributed to predation by *Cul. alburnus*. Thus, predation by *Cul. alburnus* may have significantly decreased the population size of *Can. barbata*. In addition, predation may have modified the body size distribution of *Can. barbata* through selective consumption of younger individuals. In the absence of predation by *Cul. alburnus*, young *Can. barbata* dominated the population above the dam. In contrast, in the presence of *Cul. alburnus*, larger *Can. barbata* dominated the population below the dam.”

“If this situation persists below the dam, it is possible that the population of *Can. barbata* may be eliminated from this habitat by *Cul. alburnus* through predation on both adult and young fish. Moreover, after the abundance of *Can. barbata* is greatly reduced, it is highly possible that predation pressure of *Cul. alburnus* will switch to other mid- and upper-water species, because *Cul. alburnus* also feeds on other fish species, such as *Z. pachycephalus*.”

From Kolpakov et al. (2010):

“Alburn *Culter alburnus* stands apart from the other alien species and is characterized by the highest abundance compared to the others. [...] The first sporadic findings of this species were registered in 2001. In 2006, the catches of alburn in this region reached 12 kg per 100 m² of gill

net per day (3.15 ± 0.94 kg on average); in 2007, this value was 7.5 kg per 100 m² of gill net per day (1.81 ± 0.22 kg on average). The biomass, which was assessed by beach seine trawl data, reached 0.01–0.28 g/m² (0.4–10.8% of total biomass) in June–October 2005–2007. Currently, this species is one of the most abundant, and its relative abundance is comparable to the abundance of such aboriginal commercial species as the *Leusiscus waleckii tumensis*, carp, and goldfish.”

4 Global Distribution



Figure 1. Known global distribution of *Culter alburnus*. Map from GBIF (2016).

5 Distribution Within the United States

This species has not been reported in the United States.

6 Climate Matching

Summary of Climate Matching Analysis

The climate match (Sanders et al. 2014; 16 climate variables; Euclidean Distance) was high in the North-Central U.S. and medium in the Southeast and Southern Plains. Climate match was low in the West, the Northeast, the Great Lakes coastlines, and in the Appalachian Mountains. Remaining areas had a medium match. Climate6 score indicated that the contiguous U.S. has a

high climate match. The range of scores indicating a high climate match is 0.103 and greater; Climate6 score of *Culter alburnus* was 0.186.

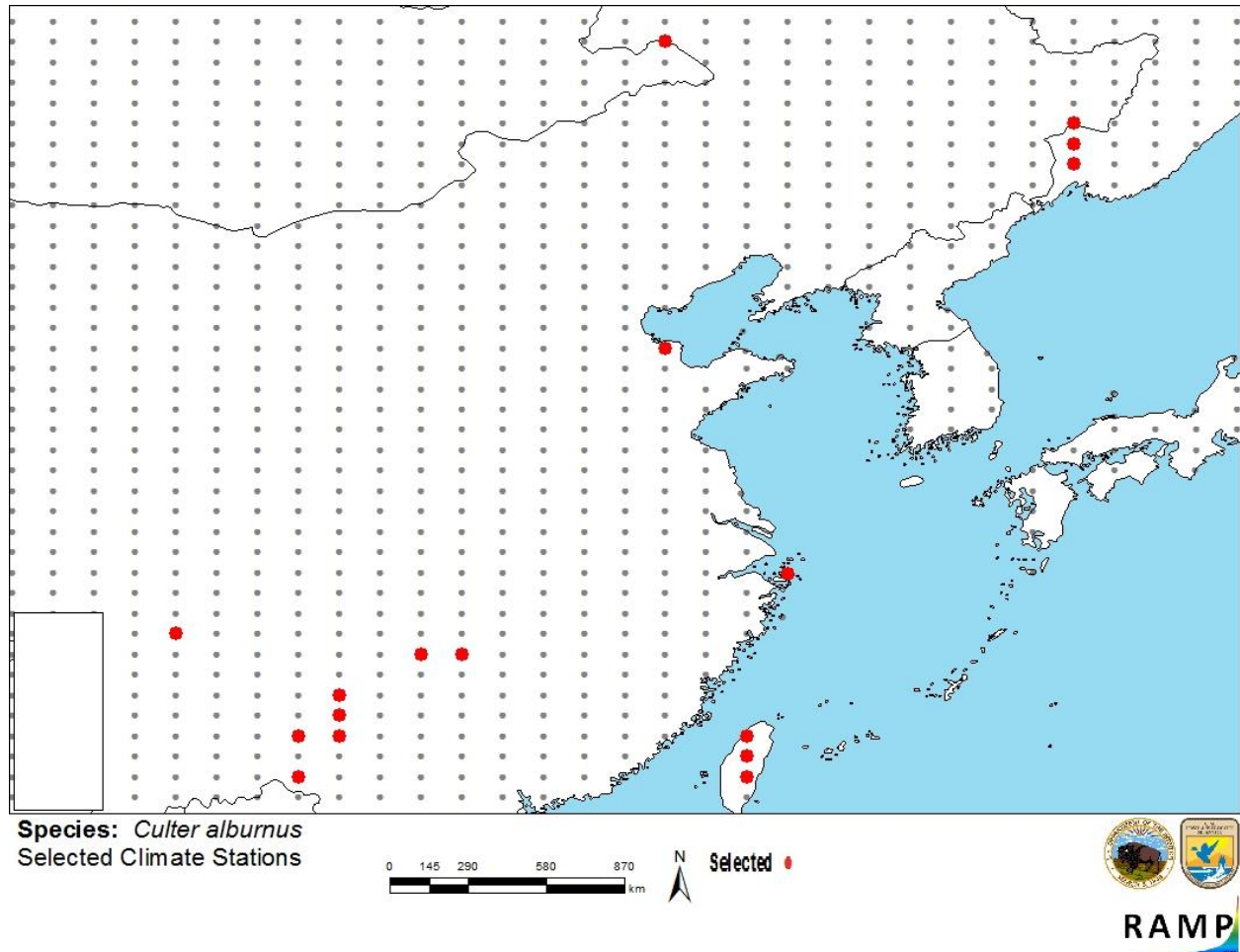


Figure 2. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red) and non-source locations (gray) for *Culter alburnus* climate matching. Source locations from Froese and Pauly (2016; including Lake Baikal in Mongolia) and GBIF (2016).

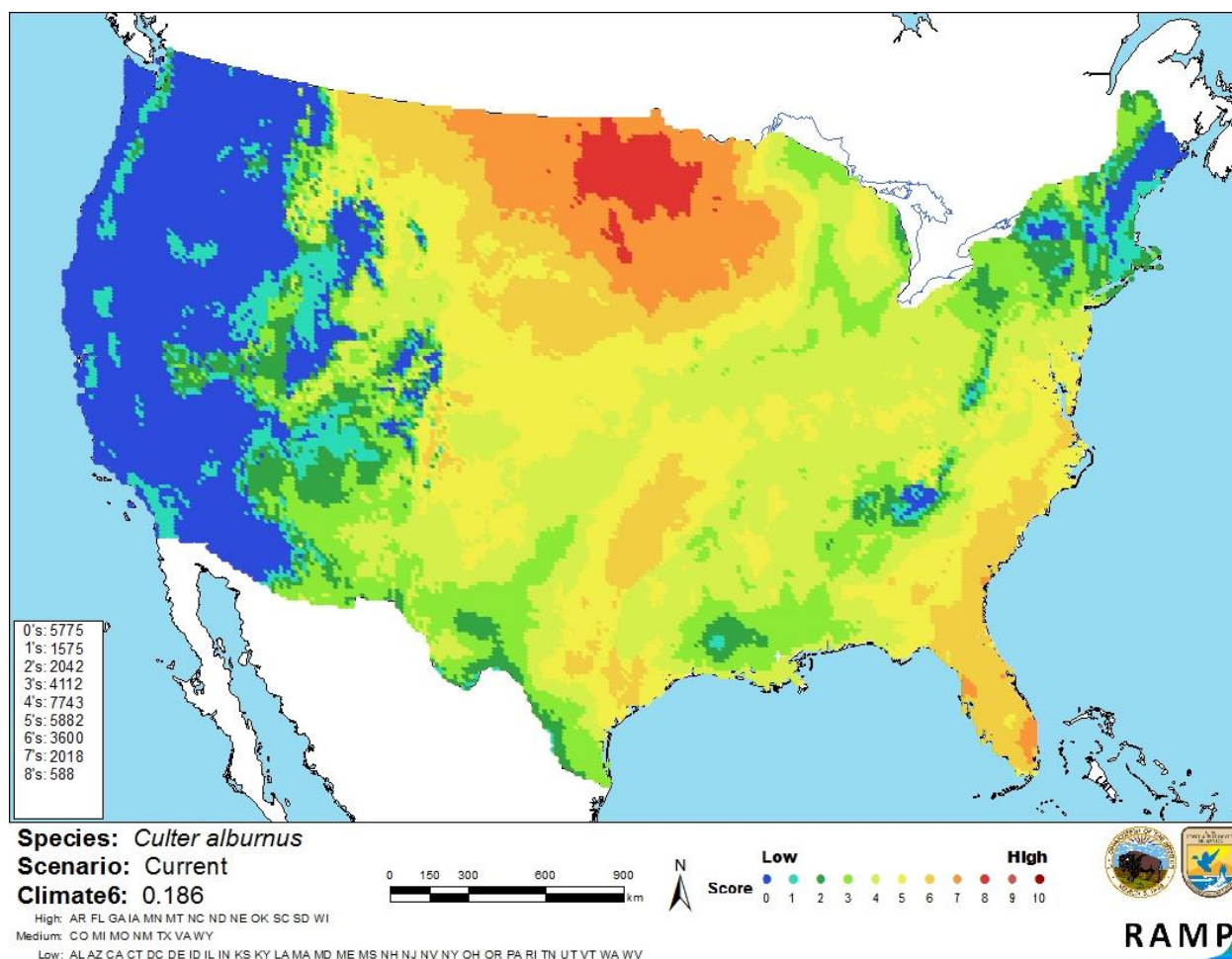


Figure 3. Map of RAMP (Sanders et al. 2014) climate matches for *Culter alburnus* in the contiguous United States based on source locations reported by Froese and Pauly (2016) and GBIF (2016). 0=Lowest match, 10=Highest match. Counts of climate match scores are tabulated on the left.

The “High”, “Medium”, and “Low” climate match categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

7 Certainty of Assessment

Information on the biology and distribution of *Culter alburnus* is sparse, at least in English language publications. However, introductions of this species have been documented multiple times, as have impacts of those introductions. Certainty of this assessment is medium.

8 Risk Assessment

Summary of Risk to the Continental United States

Culter alburnus is a cyprinid fish native to Mongolia, mainland China, Russia, and Taiwan. It has not been reported in the United States, but it has been introduced outside its native range in Taiwan and Russia. In both locations, the species quickly achieved high abundance within the fish community. In Taiwan, *C. alburnus* was observed to heavily predate a native fish species and was likely responsible for substantially reducing the native species' abundance and changing its population size structure. *C. alburnus* is a popular species for commercial and sportfishing in China. Climate match for the continental U.S. was high, with highest match occurring in the North-Central U.S. Overall risk posed by *C. alburnus* is high.

Assessment Elements

- **History of Invasiveness: High**
- **Climate Match: High**
- **Certainty of Assessment: Medium**
- **Overall Risk Assessment Category: High**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

Chiu, Y.-W., C.-W. Tso, B.-S. Shieh, C.-C. Liu, Y.-S. Lin, and S.-H. Liang. 2012. Evaluation of the predatory effects of an introduced fish, *Culter alburnus*, on the fish community in a small stream of northern Taiwan. *Zoological Studies* 51(8):1438-1445.

Froese, R., and D. Pauly, editors. 2016. *Culter alburnus* Basilewsky, 1855. FishBase. Available: <http://fishbase.org/summary/Culter-alburnus.html>. (November 2016).

GBIF (Global Biodiversity Information Facility). 2016. GBIF backbone taxonomy: *Culter alburnus* Basilewsky, 1855. Global Biodiversity Information Facility, Copenhagen. Available: <http://www.gbif.org/species/2367642>. (November 2016).

ITIS (Integrated Taxonomic Information System). 2016. *Culter alburnus* Basilewsky, 1855. Integrated Taxonomic Information System, Reston, Virginia. Available: https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=639579#null. (November 2016).

Kolpakov, N. V., E. I. Barabanshchikov, and A. Yu. Chepurnoi. 2010. Species composition, distribution, and biological conditions of nonindigenous fishes in the estuary of the Razdol'naya River (Peter the Great Bay, Sea of Japan). *Russian Journal of Biological Invasions* 1(2):87-94.

- Li, Y., T. Truc, and W. Wang. 2010. Development of polymorphic microsatellite markers in topmouth culter (*Culter alburnus*). *Conservation Genetics Resources* 2:43-46.
- Luo, Y. 1994. Some clarifications on the Cultrinae fishes of China. *Acta Hydrobiologica Sinica* 18(1):45-49.
- Luo, H. Y., P. Nie, Y. A. Zhang, G. T. Wang, W. J. Yao. 2002. Molecular variation of *Bothriocephalus acheilognathi* Yamaguti, 1934 (Cestoda: Pseudophyllidea) in different fish host species based on ITS rDNA sequences. *Systematic Parasitology* 52:159-166.
- Sanders, S., C. Castiglione, and M. Hoff. 2014. Risk Assessment Mapping Program: RAMP. U.S. Fish and Wildlife Service.
- Yin, J. S., C. Z. Xia, W. Xu, Y. F. Kuang, and D. C. Cao. 2004. Population change of *Culter alburnus* in Xingkai Lake. *Acta Hydrobiologica Sinica* 28(5):490-495.

10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

- Berg, L. S. 1964. Freshwater fishes of the U.S.S.R. and adjacent countries, volume 2, 4th edition. Israel Program for Scientific Translations Ltd., Jerusalem. (Russian version published 1949.)
- Chang, M. S. 2003. Management suggestions and conservation of Pei-Sei River, Pinlin, Taipei County. *Bull. Soc. Streams* 7:5-8. (In Chinese.)
- Chen, I. S. 2009. Indicator species of riverine fishes in Taiwan, volume 1, primary freshwater fishes. National Taiwan Ocean University Press, Keelung, Taiwan. (In Chinese.)
- Dulmaa, A. 1999. Fish and fisheries in Mongolia. Pages 187-236 in T. Petr, editor. *Fish and fisheries at higher altitudes: Asia*. FAO Fisheries Technical Paper No. 385. FAO, Rome.
- Liao, X. H., and L. C. Shih. 1956. Contribution to the biology of *Bothriocephalus gowkongensis* Yeh, a tapeworm parasitic in the young grass carp (*Ctenopharyngodon idellus* C. & V.). *Acta Hydrobiologica Sinica* 2:129-185. (In Chinese, with English abstract.)
- Liu, E. S. 2008. A study on diet composition of dominant fishes in Lake Taihu. *Journal of Fisheries of China* 32:395-401.
- Ma, G. C., K. Watanabe, H. S. Tsao, and H. T. Yu. 2006. Mitochondrial phylogeny reveals the artificial introduction of the pale chub *Zacco platypus* (Cyprinidae) in Taiwan. *Ichthyological Research* 53:323-329.
- Nichols, J. T. 1943. The freshwater fishes of China. Natural history of Central Asia, volume 9. The American Museum of Natural History, New York.

- Novikov, N. P., A. S. Sokolovsky, T. G. Sokolovskaya, and Y. M. Yakovlev. 2002. The fishes of Primorye. Far Eastern State Technical Fisheries University, Vladivostok, Russia.
- Reshetnikov, Y. S., N. G. Bogutskaya, E. D. Vasil'eva, E. A. Dorofeeva, A. M. Naseka, O. A. Popova, K. A. Savvaitova, V. G. Sideleva, and L. I. Sokolov. 1997. An annotated check-list of the freshwater fishes of Russia. *Journal of Ichthyology* 37(9):687-736.
- Wang, C. K. 2007. The research of the relationship between variations of the fish fauna and water quality of the reservoir: a study of Feitsui Reservoir in Taiwan. Master's thesis. National Taiwan University. (In Chinese.)
- Wang, W., L. Q. Chen, P. Yang, L. Hou, C. B. He, Z. M. Gu, and Z. J. Liu. 2007. Assessing genetic diversity of population of topmouth culter (*Culter alburnus*) in China using AFLP markers. *Biochemical Systematics and Ecology* 35:662-669.
- Wang, T., H.-S. Wang, G.-W. Sun, D. Huang, and J.-H. Shen, 2012. Length-weight and length-length relationships for some Yangtze River fishes in Tian-e-zou Oxbow, China. *Journal of Applied Ichthyology* 28:660-662.
- Yih and Chu 1959 [*Source did not provide full citation for this reference.*]